REMARKS

In response to the Final Office Action, the specification at paragraph [0023] has been amended to correct typographical errors and Claim 9 has been amended to further clarify the language. Claims 1-27 remain pending.

Reconsideration and allowance of this application are respectfully requested.

1. Improper Use of "Supersaturation" in the Final Office Action

All pending claims 1-24 and 27 recite a monotonic thermal profile in a stream-wise direction of the aerosol flow in the cloud condensation chamber. Claim 1 currently pending in its original form, for example, recites "a thermal control engaged to said chamber to produce a monotonic thermal profile in a stream-wise direction of the aerosol flow from said input to said output in said chamber."

With respect to this recited feature, the Final Office Action and the previous non-final Office Action dated October 24, 2007 point to the text in Col. 3, lines 7-11 and Col. 4, lines 30-40 in the cited Flagan as evidence for teaching this feature. After careful review the reasoning stated in both office actions based on the cited portions in Flagan, it has occurred to Applicants that the reasoning in both office actions is based on an incorrect understanding the technical nature of the basic principal of the "supersaturation" in a cloud condensation chamber as well understood and established in the field of aerosol science and technology.

The text in Col. 3, lines 7-11 in the cited Flagan is quoted below:

> *The CCN growth column 120 is configured to produce an increasing supersaturation profile from an input end 120A to an output end 120B along the aerosol flow. The aerosol particles having critical supersaturation within the supersaturation range produced by the CCN growth column 120 are activated and exit the CCN growth column 120 with increased sizes.*

Notably, the above quoted text describes "an increasing supersaturation profile from an input end 120A to an output end 120B along the aerosol flow." Nothing in the quoted text discusses "a monotonic thermal profile in a stream-wise direction of the aerosol flow in the cloud condensation chamber" as recited in the pending claims at issue.

Turning now to the text in Col. 4, lines 30-40 in the cited Flagan:

> *This special temperature profile can produce a monotonically increasing supersaturation profile along the center line of the condensation column 120 and can maintain a desired high spatial rate throughout the condensation column 120 without a significant decay near the output end 120B.*

This portion of the cited Flagan refers to "a monotonically increasing supersaturation profile along the center line of the condensation column 120."

Apparently, based on the best understanding of the reasoning in both office actions by Applicants, the Final Office Action along with the prior office action contends that the disclosed "monotonically increasing supersaturation profile along the center line of the condensation column 120" and "increasing supersaturation profile from an input end 120A to an output end 120B along the aerosol flow" in the cited Flagan anticipate "a monotonic thermal profile in a stream-wise

direction of the aerosol flow in the cloud condensation chamber" as recited in the pending claims at issue, such as the feature of "a thermal control engaged to said chamber to produce a monotonic thermal profile in a stream-wise direction of the aerosol flow from said input to said output in said chamber" in Claim 1.

If the above understanding by Applicants is the intent of the Patent Office, Applicants respectfully suggest that the Patent Office erred in equating "supersatuation" and "thermal profile" as well established in the field of the aerosol science and technology because the "supersatuation" is very different from the "thermal profile" or "temperature distribution or profile" in a cloud condensation chamber.

To clarify this, Applicants direct the Patent Office's attention to the "Background" section of the present patent application. Paragraph [0007] provides:

> *The ability of a particle to nucleate is at least in part determined by the saturation level of the environment, the size of the particle, and the chemical composition of the particle. When the relative humidity exceeds the saturation level where the vapor phase and the liquid phase are in equilibrium, a supersaturation state establishes and vapor begins to condense on surfaces and some particles. At a certain critical supersaturation, when the diameter of a condensation nucleus of a given chemical composition exceeds a critical diameter, the nucleus is said to be "activated." Upon this activation, vapor can condense spontaneously on that nucleus and cause the nucleus to grow to a very large size which is limited only by the kinetics of condensational growth and the amount of vapor available for the condensational growth. The critical diameter at a given supersaturation usually changes with the chemical composition of the particles. Hence, particles of different chemical compositions can become activated at different sizes. One way to*

> *characterize condensation nuclei is to measure the critical supersaturation at which a particle activates. Various cloud condensation nucleus spectrometers have been developed for producing and measuring supersaturations in a desired range.*

Therefore, the supersatuaration is a condensation state and can be affected by the temperature or thermal condition of a chamber. The supersatuaration, however, is entirely different from a temperature profile or thermal profile.

In fact, the description in the cited Flagan provides clear distinction between the supersaturation and the temperature. The text in Col. 4, lines 30-40 in the cited Flagan as quoted above refer to a special temperature profile described in previous section in Col. 4, lines 6-29, as quoted below:

> *One feature of the condensation column 120 is that the temperature difference between two successive hot and cold column segments increases. One implementation maintains the cold column segments 210 at different temperatures that decreases from the input end 120A to the output end 120B while keeping all hot column segments 220 at a common elevated temperature. Alternatively, the cold column segments 210 may be maintained at a common low temperature and the temperatures of the hot column segments 220 are higher than that low temperature and increase from the input end 120A to the output end 120B. In another variation, neither the cold column segments 210 nor the hot column segments 220 are maintained at a common temperature. However implemented, the temperature profile along the condensation column 120 not only changes in an alternating manner between high and low temperatures from one segment to another but the temperature difference also increases in the hot column segments 220 from the input end 120A to the output end 120B. In the embodiment shown in FIG. 2, the condensation column has a total of seven pairs of cold and hot column segments. The temperature difference between the two segments in each pair can be set at 2 °C at the beginning and increases 1 °C per*

> *pair. The temperature difference in the last pair at the end 120B is 8 °C..*

Therefore, in the cited Flagan, the temperature profile along the condensation column 120 not only changes in an alternating manner between high and low temperatures from one segment to another but the temperature difference also increases in the hot column segments 220 from the input end 120A to the output end 120B.

This temperature profile that spatially oscillates between high and low temperatures of the hot and cold column segments constitutes the special temperature profile described in Col. 4, lines 30-40 in the cited Flagan as relied upon in the Final Office Action. Notably, according to the cited Flagan, this special temperature profile with the described spatial oscillation can produce a monotonically increasing supersaturation profile along the center line of the condensation column 120.

Therefore, the supersaturation and the temperature profile are very different from each other. The Final Office apparently erred in its rejection due to this incorrect understanding.

This incorrect understanding, quite unfortunately, has apparently caused improper reliance on the text in Col. 3, lines 7-11 and Col. 4, lines 30-40 in the cited Flagan to support the rejections to claims with the "monotonic thermal profile" feature when Flagna does not provide any disclosure to support such rejections. This incorrect understanding has also led to an improper understanding of the detailed analysis and arguments presented in Applicants' prior response filed on February 25, 2008 in response to the non-final Office Action dated October 24, 2007. Furthermore, this incorrect understanding has led to

the finality of the current Office Action in which the prior reasoning, which completely lacks support in the disclosure of Flagan, is essentially repeated.

2. Claims 1-10, 12-14, 16-17 and 19-27 Patentable under 35 USC 102(a)

Claims 1-10, 12-14, 16-17 and 19-27 stand finally rejected under 35 USC 102(a) over Flagan. This contention is respectfully traversed.

Claim 1 recites, inter alia, a thermal control engaged to said chamber to produce a monotonic thermal profile in a stream-wise direction of the aerosol flow from said input to said output in said chamber. The cited Flagan does not disclose such a thermal control and discloses an entirely different thermal control scheme.

In the cited Flagan, the cloud condensation nucleus spectrometer has a streamwise segmented condensation nucleus growth column. Notably, the condensation nucleus growth column in the cited Flagan includes alternating hot and cold temperature-maintaining segments arranged next to one another. See the Abstract and the text in Col. 4, lines 6-29 of the cited Flagan and in the cited Flagan. The temperature profile along the condensation column 120 not only changes in an alternating manner between high and low temperatures from one segment to another but the temperature difference also increases in the hot column segments 220 from the input end 120A to the output end 120B.

This design in the cited Flagan is discussed in the present patent application and is shown in FIG. 1 of this patent application.

This design in the cited Flagan is different from the recited "monotonic thermal profile in a stream-wise direction of the aerosol flow from said input to said output in said chamber" in Claim 1 because the alternating hot and cold temperature-maintaining segments arranged next to one another in the cited Flagan does not produce a monotonic thermal profile in the stream-wise direction and is used to produce a monotonically increasing supersaturation profile along the center line of the condensation column 120 and maintain a desired high spatial rate throughout the condensation column 120 without a significant decay near the output end 120B.

As discussed above, the supersaturation profile and thermal profile are very different from each other. Therefore, Claim 1 is distinctly different from the cited teaching in the cited Flagan in the Final Office Action.

In addition, the device in Claim 1 can be implemented to produce a nearly constant supersaturation along the chamber or a quasi-uniform supersaturation along the flow direction. See, e.g., paragraph [0011], FIG. 2, and [0023]. This aspect is completely different from the "a monotonically increasing supersaturation profile along the center line of the condensation column 120" in the cited Flagan.

Therefore, Claim 1 is patentable over Flagan. Accordingly, Claims 2-10, 12-14, 16-17 and 19-24 are also patentable for the above reason and based on their own merits. For example, Claim 9 as amended now recites the heating system is structured and controlled to produce a monotonic thermal profile in a stream-wise direction of the flow and to effectuate a nearly constant supersaturation along the chamber.

Claim 25 recites controlling a temperature profile of the chamber along the aerosol flow to produce a nearly constant supersaturation along the chamber. The Final Office Action cites Col. 3 and Col. 4 in the cited Flagan to support the rejection to Claim 25. This contention can not stand because the cited Flagan does not support the rejection.

More specifically, in Col. 4, lines 30-34, Flagan teaches:

> *This special temperature profile can produce **a monotonically increasing supersaturation profile along the center line of the condensation column 120** and can maintain a desired high spatial rate throughout the condensation column 120 without a significant decay near the output end 120B.*

The "monotonically increasing supersaturation profile" in the cited Flagan is different from the "nearly constant supersaturation along the chamber" in Claim 25.

Therefore, Claim 25 is patentable. Accordingly, Claims 25 and 27 are patentable based on the above reason and on their own merits.

Claims 1, 7-9, 16, 18, 22 and 25 stand rejected under 35 USC 102(a) over Russell. This contention is respectfully traversed.

To support the rejection, the Office Action cites Col. 5, lines 10-18 in the cited Russell. The text in Col. 5, lines 3-18 in the cited Russell is quoted below:

> *A preferred embodiment, the Automated Mobility-Classified-Aerosol Detector (AMCAD), has an alternating dual-bag sampler, a particle charger, an improved differential mobility analyzer (DMA), and a condensation nucleus counter (CNC). The implementation of automated feed back control of flow rates allows the preferred embodiment of the present invention to achieve high-resolution and high precision*

> *measurements under changing pressures. The AMCAD also controls the temperatures of the saturator and the condenser in the condensation nucleus counter to achieve consistent high counting efficiency as the temperature of the incoming aerosol sample changes. The adverse effects associated with the humidity level of the aerosol sample are reduced by desiccating the dilution flow that mixes with the aerosol sample flow at the entrance of the condensation nucleus counter.*

The above cited portion of the cited Russell does not disclose "a thermal control engaged to said chamber to produce a monotonic thermal profile in a stream-wise direction of the aerosol flow from said input to said output in said chamber" as recited in Claim 1. Therefore, Claim 1 is patentable.

Similarly, Claims 7-9, 16, 18 and 22 are patentable based on the above analysis and on their own merits.

Therefore, all rejections under 35 USC 102(a) lack support in the cited Flagan and Russell and thus must be withdrawn.

<u>3. Claims 11, 15 and 18 Patentable under 35 USC 103(a)</u>

Claims 11 and 15 stand finally rejected under 35 USC 103(a) over the cited Flagan. This contention is respectfully traversed based on the above analysis for Claim 1 because the base Claim 9 of Claims 11 and 15 also cites that "the heating system is configured to produce a monotonic thermal profile in a stream-wise direction of the flow" as cited in Claim 1. Therefore, the rejections must be withdrawn.

Claim 18 stands rejected under 35 USC 103(a) over the cited Flagan in view of the cited Russell. Claim 18 is based on Claim 9 and thus is patentable over the cited Flgan in view of the cited Russell based on the above analysis with respect to Claim

1 in connection with the cited Flagan and Russell, respectively. Therefore, Claim 18 is patentable.

4. Conclusion

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Applicants ask that all claims be allowed. Please apply any other applicable charges, or credits, to deposit account 06-1050.

Respectfully submitted,

Date: August 4, 2008

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